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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,551	07/28/2003	John A. Severson	B04.12-0071	3586

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EXAMINER	
SUN, XIUQIN	

ART UNIT	PAPER NUMBER
2863	

DATE MAILED: 05/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/628,551	SEVERSON ET AL.	
	Examiner	Art Unit	
	Xiuqin Sun	2863	

-- The MAILING DATE of this communication appears on the cover sheet with th correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-13 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-13 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

3. Claim 3 recites the limitation "the Ludlam Limit". There is insufficient antecedent basis for this limitation in the claim.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly

owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1, 2 and 9-13 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3 and 7-12 of U.S. Patent No. 6,560,551 B1 to Severson et al. Although the conflicting claims are not identical, they are not patentably distinct from each other because they are obvious variants of each other, as shown in Table 1 below.

Table 1

#10/628551 claims	**#US 6,560,551 B1 claims**
1. An apparatus for determining liquid water content in a body of air, comprising: a probe system comprising a probe configured to permit measuring a rate at which ice accretes on the probe from supercooled water in a body of air; sensing circuit to sense a parameter that changes as ice accretes on the probe and to provide an output signal which is a function of ice accretion the probe, means for providing signals indicative of air temperature and relative velocity of the body of air as air moves relative to the probe; a logic device communicatively connected to the probe system, configured to accept inputs from the sensing circuit, and inputs representing air temperature and relative velocity of the body of air from the means for providing, and a set of stored data providing an input to the logic device, the logic device performing operations on the inputs including determining the rate of change of ice	1. An apparatus for determining the liquid water content in air flowing past an aircraft comprising: a vibrating ice detector probe mounted on the aircraft and excitable to vibrate at a resonant frequency which changes as ice accretion occurs, a frequency determination circuit for determining the frequency of vibration of the ice detector probe, and for calculating rate of change of such frequency, including a processor, an input to the processor indicating airspeed, and an input to the processor indicating air temperature, the processor correlating parameters comprising the rate of change of frequency, and air velocity and air temperature inputs to previously established relationships between these parameters characterized by one of a lookup table and algorithm in the processor to provide an output indicating liquid water content.

accretion, and producing an output indicating liquid water content in the body air using the set of stored data.	
2. The apparatus of claim 1, and a heating device communicatively connected to the logic device, and configured for heating the probe sufficiently when activated by an output from the logic device, to diminish the ice accreted on the probe.	2. The apparatus of claim 1 including probe deicing heaters connected to receive the output for activating the probe deicing heaters at selected times.
9. An apparatus for determining liquid water content in a body of air, comprising a probe, a sensing device associated with the probe that provide a signal that changes predictably as a function of a quantity of ice accreted on the probe; the sensing device including a probe sensing circuit configured to provide a signal indicating the rate of ice accretion on the probe; a logic device, communicatively connected the probe sensing circuit and configured accept inputs comprising the signal indicating the rate of ice accretion, the temperature of the body of air and the relative airspeed past the probe, the logic device performing operations on the inputs and producing outputs based on the operations; a memory storage device, communicatively connected to the logic device, configured to supply stored data as an input to the logic device, including stored data representing measurements of liquid water content under known conditions of rate of change of the signal indicating the rate of ice accretion on the probe, the temperature of the body air and the relative airspeed past the probe, and the logic device correlating the rate of change of the signal indicating the rate of ice accretion on the probe, the temperature the body of air and the relative airspeed past the probe with the stored data to provide an output indicating	8. An apparatus for determining liquid water content in a body of air, comprising a probe system comprising a probe, configured to vibrate at a frequency that changes as ice accretes on the probe from supercooled water in a body of air; a logic device, communicatively connected to the probe system, configured to accept inputs from the probe system and provide a parameter indicating a rate of change of frequency of vibration of the probe, the logic device connected to receive additional input parameters representing a temperature of the body of air and a relative velocity of the body of air past the probe system, and the logic device including a set of stored data based on previously established relationships between the parameters as the parameters change to determine liquid water content in the body of air; and a heating device, communicatively connected to the logic device, and configured for heating the probe sufficiently, when activated by an output from the logic device, to diminish ice accreted on the probe.

liquid water content in the body of air.	
10. The apparatus of claim 9, wherein the logic device is configured to perform at least one cycle of temporarily activating a heating device to heat the probe, determining the rate of change of ice accretion of the probe after the heating device has been deactivated, and then correlating the determined rate of change of ice accretion after heating with the other inputs.	9. The apparatus of claim 8, wherein the logic device includes circuitry to perform at least one cycle of temporarily activating the heating device to heat the probe, and then to measure the rate of change of frequency of the probe after the heating device has been deactivated. 10. An apparatus for determining liquid water content in a body of air, comprising a probe, configured to vibrate at a frequency that changes predictably as a function of a quantity of ice accreted on the probe from an amount of supercooled water in a body of air; a probe sensing circuit, configured to measure the frequency at which the probe vibrates; a logic device, communicatively connected to the probe sensing circuit and configured to accept inputs of frequency of vibration, temperature of the body of air and relative airspeed past the probe, the logic device, performing operations on the inputs, and producing outputs based on the operations; a memory storage device, communicatively connected to the logic device, configured to supply stored data as input to the logic device, including stored data representing measurements of liquid water content under known conditions of rate of change of frequency, temperature of the body of air and relative airspeed past the probe, and the logic device correlating the rate of change of frequency, the temperature of the body of air and the relative airspeed past the probe with the stored data. 11. The apparatus of claim 10, wherein there is a heating device on the probe controlled by the logic device, the logic device configured to perform at least one

	cycle of temporarily activating the heating device to heat the probe, then measuring the rate of change of frequency of the probe after the heating device has been deactivated, and correlating the measured rate of change of frequency after heating with the other inputs.
11. The apparatus of claim 10, wherein the set of stored data comprises data from previous tests of the probe under controlled conditions, configured to serve as a basis for comparison with new inputs.	12. The apparatus of claim 10, wherein the set of stored data comprises data on previous tests of the probe system under controlled conditions, configured to serve as a basis for comparison with new inputs.
12. A method of determining liquid water content in an airflow, for signaling icing conditions for an aircraft, wherein the aircraft is moving relative to the air flow, including providing an ice detector probe on the aircraft, providing an ice detector sensor on the probe having an output that changes as ice accretes on the probe, determining changes in the output of the ice detector sensor to provide a rate signal indicating rate of ice accretion on the ice detector probe, determining the rate of change of the rate signal, determining airspeed of the air vehicle, determining air temperature of the airflow, and correlating the parameters comprising the rate signal, the determined airspeed and the determined airflow temperature with previously established relationships between these parameters stored in one a lookup table and algorithm for providing an output indicating liquid water content of the air. 13. The method of claim 12, further comprising, performing at least one cycle of heating the probe to remove ice accreted thereon, and, repeating the steps of determining the rate of change of the rate signal, the temperature, and the	3. A method of determining liquid water content in an airflow, for signaling icing conditions for an air vehicle, including providing a vibrating ice detector probe on the aircraft, determining frequency changes indicating ice accretion on the ice detector probe, determining the rate of change of frequency of the ice detector probe as ice accretes, determining airspeed of the air vehicle, determining air temperature of the airflow and combining parameters comprising the airspeed, air temperature and the rate of change of frequency for correlation to previously established relationships between these parameters characterized by one of a lookup table and algorithm in the processor for providing an output indicating liquid water content of the air. 7. The method of claim 3, and further comprising performing at least one cycle of heating the probe, and repeating the steps of determining frequency changes, the temperature, and the airspeed, and performing the operation producing an output indicating liquid water content of the airflow.

airspeed, and performing the correlating to provide a new output indicating liquid water content of the airflow.	

Table 1 shown above lists the literal difference between the claims 1, 2 and 9-13 in the instant application (hereinafter '8551) and the claims 1-3 and 7-12 in the U.S. Patent No. 6,560,551 B1 (hereinafter '0551). The differences are summarized as follows:

1) "... a probe system comprising a probe ..." is met by "... a vibrating ice detector probe ...", in the sense that both have the functionality to provide an icing probe configured to permit measuring a rate at which ice accretes on the probe from supercooled water;

2) "sensing circuit to sense a parameter that changes as ice accretes on the probe ....." is met by "a frequency determination circuit ...", since the latter can be understood as a specific embodiment of the former;

3) "a set of stored data providing an input to the logic device" is met by "...previously established relationships between these parameters characterized by one of a lookup table and algorithm in the processor....", since a lookup table is obviously a set of stored data in the processor;

4) "... configured for heating the probe sufficiently when activated by an output from the logic device ..." is obviously covered by "...deicing heaters connected to receive the output for activating the probe deicing heaters at selected times...", and from the context, it is understood that the main subject matter to be claimed in both cases is "deicing heaters";

5) "... including stored data representing measurements of liquid water content under known conditions ..." is met by "including a set of stored data based on previously established relationships between the parameters..." exception that slightly different terminologies are used;

6) "the rate of change of ice accretion of the probe" is met by "the rate of change of frequency of the probe ... that changes predictably as a function of a quantity of ice

accreted on the probe", in the sense that both of them are referred to as the time derivative of change of frequency of the probe vibration.

It is deemed that other subject matter disclosed in claims 1, 2 and 9-13 of the instant application is also recited in the claims 1-3 and 7-12 of '0551 patent. Thus with respect to above discussion, it is the Examiner's view that both the instant application '8511 and '0511 patent essentially claim patentably the same invention. To the extent that the instant claim is broader and therefore generic to the patented claims [species], In re Goodman 29 USPQ 2d 2010 CAFC 1993, states that a generic claim cannot be issued without a terminal disclaimer, if a species claim has been previously been patented.

6. Claims 4-7 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3 and 7-12 of U.S. Patent No. 6,560,551 to Severson et al. in view of U.S. Patent No. 5,641,972 to Breda. Both references deal with a method of measurement of the liquid water content.

Severson et al. teach a method includes the subject matter discussed above except that: the probe comprises a surface on which a ice accretes, and a sensor associated with said surface for determining when ice accretes thereon, to provide the output signal; the probe comprises a surface on which ice accretes, a source of light directed toward said surface, a sensor for sensing light back scattered from accretion of ice on the surface, said sensor providing the output signal; the probe comprises a surface having an orifice therein, a pressure sensor connected to the orifice, and the pressure sensor providing the output signal based on a function of ice blocking the orifice; the output signal is based on measurement of time from when ice starts to block the orifice until the orifice is completely blocked.

Breda is directed to a method and sensor for measuring the concentration of water in liquid phase in a gas moving relative to the sensor, and teaches: a surface on which a ice accretes, and a sensor associated with said surface for determining when ice accretes thereon, to provide the output signal (cols. 3-4, lines 56-3); a surface on which ice accretes, a source of light directed toward said surface, a sensor for sensing light back scattered from accretion of ice on the surface, said sensor providing the output signal (cols. 3-4, lines 56-3); a surface having an orifice therein, a pressure sensor connected to the orifice, and the pressure sensor providing the output signal based on a function of ice blocking the orifice (col. 1, lines 41-52); the output signal is based on measurement of time from when ice starts to block the orifice until the orifice is completely blocked (col. 1, lines 41-52).

It would have been obvious to one having ordinary skill in the art at the time was made to include the teaching of Breda in the invention of Severson et al. in order to provide alternative approaches for detecting liquid water content that are applicable to an aircraft (Breda, col. 1, lines 11-16).

7. Claims 8 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3 and 7-12 of U.S. Patent No. 6,560,551 to Severson et al. in view of U.S. Patent No. 4,688,185 to Magenheim et al.; Both references deal with an apparatus for measuring ice accretion.

Severson et al. teach a method includes the subject matter discussed above except that: said probe comprises a surface having a microwave wave guide thereon, a circuit connected to the microwave wave guide including a comparator for comparing

signals directly from a source connected to the wave guide and from an output of the wave guide to determine changes when source has accreting thereon, said comparator providing the output signal.

Magenheim et al., entitled a microwave ice accretion measuring instrument, teach: a surface having a microwave wave guide thereon, a circuit connected to the microwave wave guide including a comparator for comparing signals directly from a source connected to the wave guide and from an output of the wave guide to determine changes when source has accreting thereon, said comparator providing the output signal (col. 1, lines 41-55).

It would have been obvious to one having ordinary skill in the art at the time was made to include the teaching of Magenheim et al. in the invention of Severson et al. in order to provide an alternative for detecting liquid water content that can be implemented by means of an ice detector mounted adjacent an air foil surface (Magenheim et al., col. 24-55).

Prior Art Citations

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1). Hill et al. (U.S. Pat. No. 4441363) disclose an apparatus and method for liquid water content measurement.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xiuqin Sun whose telephone number is (571)272-2280. The examiner can normally be reached on 6:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571)272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Xiuqin Sun
Examiner
Art Unit 2863

X.S
May 3, 2004

John Barlow
Supervisory Patent Examiner
Technology Center 2800